

*On the Magnetism developed in Copper and other Substances during Rotation. In a Letter from Samuel Hunter Christie, Esq. M.A. &c. to J. F. W. Herschel, Esq. Sec. R.S. Communicated by J. F. W. Herschel, Esq. Read June 16, 1825. [Phil. Trans. 1825, p. 497.]*

Mr. Christie in this communication gives an account of some experiments on the development of magnetism in copper by rotation. He corroborates by his own experience the results obtained by Mr. Babbage and Mr. Herschel, in which a disc of copper was set in rotation by the rotation of one or more magnets beneath it, both in the case when poles of the same name were immediately below the disc and when of a contrary name. The action appeared equally intense in both cases, and from this circumstance the author concludes the magnetism thus communicated to the copper to be extremely transient. The experiment was varied by combining the revolving magnets differently, and the results are stated.

The next experiments of Mr. Christie were directed to the determination of the law according to which the force diminishes as the distance between the disc and magnets increases. It seems to follow from these experiments, that when a thick copper plate is made to revolve under a small magnet, the force tending to deviate the needle is directly as the velocity, and inversely as the fourth power of the distance; but that when magnets of considerable size are made to revolve under these copper discs, the diminution follows more nearly the ratio of the inverse square of the distance, or between the square of the cube, though not in any constant ratio of an exact power.

The author then investigates the law of force when copper discs of different weights are set in rotation, which for small distances appear proportioned to the weights of the discs, but for greater ones appear to vary in some higher ratio.

*On the annual Variations of some of the principal Fixed Stars. By J. Pond, F.R.S. Astron. Royal. Read June 16, 1825. [Phil. Trans. 1825, p. 510.]*

This communication consists of a table stating the annual variations of 23 of the principal fixed stars, as deduced from Dr. Brinkley's observations, and those of the Astronomer Royal. On these Mr. Pond remarks, that out of 16 stars observed at Dublin, 13 either indicate a southern deviation, or at least are not inconsistent with it, and that of these 13, about half indicate a greater deviation than that assigned by Mr. Pond himself. The other half a less, while the three remaining stars deviate northwards.

Mr. Pond further remarks, that the examination of this table is calculated rather to increase than to diminish scepticism on the subject of the determination of such very small quantities by astronomical observations. He concludes by disclaiming all intention of placing

the subject in a controversial point of view, and by expressing a hope that the difficulty will in a very few years be satisfactorily cleared up.

*On the Nature of the Function expressive of the Law of Human Mortality, and on a new Mode of determining the Value of Life Contingencies. In a Letter to Francis Baily, Esq. F.R.S. &c. By Benjamin Gompertz, Esq. F.R.S. Read June 16, 1825. [Phil. Trans. 1825, p. 513.]*

This paper, which professes to be a continuation of former researches on the same subject printed in the Transactions of the Royal Society, is divided into two chapters. In the first the author considers the nature of the law of those numbers in tables of mortality, which express the amount of persons living at the end of ages in regular arithmetical progression. He remarks that for short intervals the law approaches nearly to a decreasing geometrical progression, and that this must be the case whatever be the strict expression for the law of mortality, provided the intervals do not exceed certain limits. But he further remarks, that this property will be found to belong to very extensive portions of tables of mortality, and instances Deparcieux's tables, where from the age of 25 to that of 45, the numbers living at the end of each year decrease very nearly in geometrical progression.

Considering however the whole extent of such a table, it will be found that the ratio of this geometrical progression is not the same in all parts of the table. But before he enters on this consideration, the author draws some consequences from the hypothesis of a geometrical progression being the strict law of nature after a certain age. One of these is the equality of value of all life annuities commencing after that age. Another is, that the want of instances in history of persons living to very enormous ages (waving those of the patriarchs,) is no proof that such may not be the law of nature, as he shows by calculation, that out of 3,000,000 persons of 92, not more than one should on this supposition reach 192. This leads him to some general considerations on the causes of death, after which he resumes the consideration of the general law of the tables.

To find this *à priori*, he supposes that a person's resistance to death decreases as his years increase, in such a manner, that at the end of equal infinitely small intervals of time, he loses equal infinitely small portions of his vital powers. He further supposes, that among any given number of persons of equal vital powers the probability of death is the same, but that among all, it is inversely proportional to the vitality. These postulata being assumed, he enters into an analytical investigation, the result of which is a representation of the law of life by such a function as is sometimes called a double exponential, that is, a geometric progression in which the ratio is itself variable in geometric progression.

He then proceeds to examine the coincidence of this law, with several tables of the best authority, such as those of Deparcieux,